Snow Surveyors Climbing to a Snow Course

FEDERAL-STATE COOPERATIVE SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

MONTANA

APRIL 1, 1946

by

Montana Agricultural Experiment Station
and
Division of Irrigation, Soil Conservation Service
United States Department of Agriculture

in cooperation with

U. S. Forest Service
U. S. Geological Survey
U. S. National Park Service
State Engineer of Montana

WATER SUPPLY OUTLOOK FOR MONTANA APRIL 1, 1946

Based on surface water conditions, precipitation data, reservoir storage, soil moisture conditions, and on the water content of the snow cover on the higher watersheds of the principal drainage basins.

The District Engineer's Office of the U.S. Geological Survey at Helena, reports below normal flows for streams in the Northern, Central, and Eastern parts of the state. Near normal flow for streams west of the Continental Divide is apparent from recent measurements.

The U.S. Weather Bureau Office at Helena, reports that the weather from January thru March has been exceptionally mild. Precipitation averaged near normal and no severe storms or cold waves occurred. During March the mean temperature 38.5° , was 7.2° above normal.

More water was held in storage in reservoirs in Montana on April 1st, than a year ago. Twenty-four reservoirs in the Missouri Basin, not including Fort Peck, contained 866,530 acre feet on April 1st, as compared with 647,620 acre feet a year ago. Present storage represents 61% of the usable capacity. Last year the amount stored was 46% of the usable capacity. Fort Peck reservoir contained 1,730,000 acre feet more than last year.

West of the Divide 15 irrigation reservoirs contained 80,170 acre feet on April 1st, as compared to 76,009 acre feet in 1945. Present storage represents 39% of the usable capacity. A year ago the amount held in storage was 37% of the usable capacity. Flathead Lake which is primarily for power held 67,500 acre feet more than a year ago.

Reports concerning soil moisture have been received from the North Montana Branch Station, the Judith Basin Branch Station, and from the Huntley Field Station. The report from the North Montana Branch Station indicates that the moisture penetration at the Havre Station is about 18 inches, which is 6 inches less than a year ago. On the basis of past experience this justifies a yield expectancy of 8 bushels of wheat per acre assuming a normal summer rainfall. At the Judith Basin Station, soil moisture conditions are reported the best for a number of years. At Huntley,soil moisture penetration is reported at about average.

The water content of the snow cover on the higher water sheds at the head waters of the Missouri River ranges from 8% above 1945 on the Bozeman Creek watershed to 100% above on the Gallatin-Madison divide. Compared to the 5 year average the present water content is from 15% to 64% higher.

The snow cover on the water sheds of the minor tributaries of the Missouri entering between Three Forks and Great Falls is comparatively light. The water content is from 10 to 30% less than a year ago and from 10 to 38% less than the 5 year average.

(Con'd)

Snow surveys on the watersheds of the principal tributaries, the Sun River, the Marias, and the Musselshell, indicate a great water content than last year. Compared with the 5 year average the present water content is higher on the Sun River and Marias watersheds, but less on those tributary to the Musselshell.

In the Yellowstone Drainage Basin, the water content of the snow cover is from 14% to 56% greater than last year at the higher elevation, with the exception of Camp Senia on Rock Creek in the Bear Tooth Mountains, where the water content is 15% less than last year. Present conditions are slightly above the 5 year average.

West of the Continental Divide the water content at all snow courses was in most cases considerably above that observed a year ago. At the lower elevations the water content compared to April 1, 1945 varied from 1/3 as much on Logan Creek to 7 times as much at Kisheneen on the North Fork of the Flathead.

Generally speaking the high water content of the snow cover observed on April 1, would indicate that normal to above normal precipitation during April and May will result in runoff conditions comparable to 1943.

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SUMMARY OF WATER CONTENT MEASUREMENTS
ON THE PRINCIPAL WATERSHEDS OF MONTANA AS OF APRIL 1.

Name of Watershed	No. of Snow Courses	Av. W.C. 1946 Inches	Av. W.C. 1945 Inches	5 Yr. Av. W.C. Inches
MISSOURI DRAINAGE				
Gallatin	7	12.6	8.1	9.1
Madison	4	14.1	8.3	10.3
Jefferson	5	7.1	5.4	(less than 5 years)
Three Forks to Great Falls	6	8.5	8.0	8.1
Sun River	1	9.9	6.6	7.2
Marias	2	11.1	7.8	(less than 5 yrs.)
Musselshell	5	8.4	5.1	7.8
YELLOWSTONE DRAINAGE				
Above Livingston	6	11.1	8.2	(less than 5 yrs.)
Shields River	1	3.8	3.3	5.2
Boulder	2	12.4	8.6	9.5
Clarks Fork	2	7.2	6.9	7.2
COLUMBIA DRAINAGE				
Flathead	12	27.6	21.1	19.1
Bitterroot	6	26.1	18.1	18.2
Blackfoot	8	8.0	6.5	(less than 5 yrs.)
Kootanai	2	27.1	13.9	17.5

U.S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

DATA, TOTAL PRECIPITATION FOR MARCH

	Precip-itation	Departure from Normal
WEST OF DIVIDE		
Butte	0.69	+0.05
Deer Lodge	0.68	+0.07
Hamilton	0.65	-0.04
Kalispell	0.55	-0.40
Missoula	0.76	-0.06
CENTRAL DIVISION		
Babb	1.94	+0.83
Dillon	0.69	-0.47
Fort Benton	0.56	-0.06
Great Falls	0.42	-0.44
Chinook	0.19	-0.34
Helena, WBO	0.56	-0.23
Livingston	0.78	-0.08
Lewistown Arpt.	0.54	-0.49
Mystic Lake	3.77	+1.72
EASTERN DIVISION		
Billings Arpt.	1.35	
Circle	0.21	-0.79
Frazer	0.33	-0.37
Malta	0.37	-0.17
Mildred	0.65	-0.23
Medicine Lake	0.11	-0.30
Miles City	0.50	-0.36
Ft. Peck	0.21	-0.29

STORAGE IN RESERVOIRS IN MONTANA

MISSOURI RIVER BASIN — MARCH 31, 1946

RESERVOIR			Contents this mth. Acre-Feet	Contents a Yr.ago Acre-Feet
Lake Sewall	Missouri	37,800	35,100	35,470
Hauser Lake	Missouri	52,090	47,920	13,090
Holter Reservoir	Missouri	73,600	79,060	77,160
Ft. Peck Res.	Missouri	19,000,000	12,890,000	11,160,000
Ruby Res.	Ruby	38,850	34,670	26,400
Harrison Lake	Willow Cr.	17,760	4,600	
Hebgen Res.	Madison R.	345,000	179,600	227,400
Madison Res.	Madison R.	41,000	38,350	34,060
Smith R. Res.	Smith R.	10,700	7,900	6,750
Gibson Res.	N.Fk. Sun R.	105,000	68,860	63,610
Willow Cr./N.Fk. Sun R.&Willow Cr.		32,300	11,240	21,890
Pishkun Res.	N.Fk. Sun R.	32,000	22,780	17,100
Lower Two Medicine L./Two. Medicine R.		14,000		
Four Horns Res.	Badger Cr.	20,000	5,500	5,300
Birch Creek Res.	Birch Cr.	30,000	22,510	23,880
Lake Francis Res./Birch&Dupuyer Cr.		112,000	96,040	99,380
Ackley Lake	Judith River	5,820	2,450	5,520
Durand Res.	N.Fk. Musselshell	7,010	5,760	6,980
Deadman's Basin	Musselshell R.	52,500	47,000	51,040
Martinsdale Res./S.Fk. Musselshell		23,100	9,480	11,530
Fresno Res.	Milk R.	127,200	61,810	54,420
Nelson Res.	Milk R.	66,800	28,560	36,490
Mystic Lake	W.Rosebud Creek	20,800	9,290	8,560
Glacier Lake	Rock Cr.	4,200		
Cooney Res.	Red Lodge Cr.	27,500	7,250	11,250
Tongue R.	Tongue R.	73,900	8,450	12,880
Sherburne Lake Res./Swiftcurrent Cr.		66,100	24,080	23,040
Lake Helena	Missouri	10,450	8,270	

DATA FURNISHED BY OPERATING ORGANIZATIONS

COMPILED BY WATER RESOURCES BRANCH, U.S. GEOLOGICAL SURVEY,

HELENA, MONTANA

STORAGE IN RESERVOIRS IN MONTANA

COLUMBIA RIVER BASIN — MARCH 31, 1946

RESERVOIR	Location on or diverting from	Usable Capacity Acre -feet	Contents this month Acre-Feet	Contents a year ago Acre-Feet
Georgetown Lake	Flint Cr.	31,000	22,780	17,440
E Fk Rock Cr. Res.	E Fk Rock Cr.	16,040	2,640	
Nevada Cr. Res.	Nevada Cr. Res.	12,600	9,820	
W Fk Bitterroot Res.	W.Fk.Bitterroot R.	31,700	10,000	10,000
Como Lake	Rock Cr.	34,800		5,000
Flathead Lake(Somers)	Flathead R.	1,791,000	658,700	591,200
Little Bitterroot L.	Lt.Bitterroot R.	18,000	1,350	900
Hubbart Reservoir	Lt.Bitterroot R.	12,100	1,510	2,100
Upper Dry Fork Res.	Dry Fork Cr.	2,700	355	265
Dry Fork Res.	Dry Fork Cr.	4,000	1,070	1,260
Twin Reservoir Canals	(Mission Valley)	600	415	64
Pablo Res.Canals	" "	25,000	3,660	11,080
Lower Crow Res.	Crow Cr. " "	10,350	8,850	9,680
Kicking Horse Res.Canals	" "	8,350	3,260	3,660
Ninepipe Res.Canals	" "	14,870	9,880	7,080
McDonald Res.	Post Cr. " "	8,225	7,180	4,710
Mission Res.	Mission Cr. " "	7,250	3,420	4,620
Tabor Res.	Dry Cr. " "	23,300	6,440	3,150
Lower Jocko L.	Jocko R. " "	7,600	0	0

DATA FURNISHED BY OPERATING ORGANIZATIONS

COMPILED BY WATER RESOURCES BRANCH, U.S. GEOLOGICAL SURVEY, HELENA, MONT.

MONTANA COOPERATIVE SNOW SURVEYS

April 1, 1946

Drainage Basin / Name of Snow Course	Local Water-Shed	Elev. of Snow Course	Date	1946 Measurements Snow Depth	Water Content	Water Content Readings for Corresponding Dates 1941,1942,1943,1944,1945	5 Yr. Av.	1946 compared to 1945 %	1946 compared to 5 Yr.Av.%
GALLATIN									
Mystic Lake	Bozeman Cr.	6600	4-3	26.2	8.1	2.7: 7.8: 5.2: 8.9: 7.5:	6.35	108	127
New World	Bozeman Cr.	6600	4-3	32.6	9.8	3.7: 9.5: 8.3:12.1: 8.6:	8.45	114	116
Ross Peak	Spring Cr.	7000	4-1	34.0	9.6	4.0: 9.3: 4.9: 6.3: 5.5:	6.0	174	160
Hood Meadow Ext.	Middle Cr.	6600	4-3	28.0	8.4	2.9: 8.7: 7.6: 8.5: 6.2:	6.8	135	123
Devil's Slide	Middle Cr.	8100	4-3	72.	24.2	12.3:20.3:20.6:16.2:15.1:	16.9	160	143
21 Mile	Gal-Madison	7175	4-1	60.9	20.	9.5:12.8:24.7:12.0:10.0:	13.8	200	145
320 Ranch	Gallatin	6600	4-1		7.95	5.7: 5.0: 8.2: 5.9: 4.2:	5.8	189	137
MADISON									
Norris	Gibbon	7500	4-3	32.1	8.7	5.5: 6.3:15.5: 8.8: 7.6:	8.7	114	100
West Yellowstone	Madison	6700	4-1	40.1	12.6	6.9: 8.6:18.3: 7.1: 7.3:	9.6	172	131
Hebgen	Madison	6500	4-2	45.9	15.3	7.3: 8.6:14.6: 7.8: 8.2:	9.3	186	164
21 Mile	Gal-Madison	7150	4-1	60.9	20.0	9.5:12.8:24.7:12.0:10.0:	13.8	200	145
JEFFERSON									
Gibbons Pass	Gibbon	7100	4-1	64	25.4	14.3:21.6:28.9:14.9:16.5:	19.2	154	132
Elkhorn	Beaverhead	9450	4-1	35	9.9	2.9: 7.2:14.2: 6.4: 6.0:	7.3	165	135
Pipestone Pass		7200				3.5: 5.4: 6.5: 4.6: 5.1:	5.0		
Flashlight	Ruby		4-1	25.5	6.5			(Began Record 1945	
Miner Lake	Big Hole		3-29	30.9	7.6	5.5:		(Began Record 1945	

MONTANA COOPERATIVE SNOW SURVEYS

April 1, 1946

Drainage Basin / Name of Snow Course	Local Watershed	Elev. of Snow Course	Date	1946 Measurements Snow Depth	Water Content	Water Content on Corresponding Dates 5 Year Period 1941,1942,1943,1944, 1945	5 Yr. Av.	1946 compared to 1945%	1946 compared to 5 Yr.Av.%
MISSOURI MAIN STEM									
Rimini	Lower Ten Mile Cr.	6250	4-1	17.0	3.8	2.5 : 7.2: 7.7: 5.2 : 5.6	5.6	67	67
Rimini	Middle Creek	6800	4-2	29.8	7.9	4.6 :10.7:13.7: 8.1 : 8.2	9.1	96	87
Rimini	Upper Creek	8000	4-2	35.8	10.8	6.4 :13.0:18.1:10.5 :12.0	12.0	90	90
Chesman	" "	6200	4-3	8.0	2.4	.9 : 4.4: 7.2: 3.6 : 3.6	3.9	67	62
Stemple Pass	Lt. Prickly Pear	6900	4-1	30.1	8.6	3.4 : 7.3:14.6: 6.3 : 9.2	8.2	93	105
Kings Hill	Belt Cr.	7950	4-1	50.2	17.4	8.8 :12.0:14.2:10.9 : 9.5	11.1	183	156
Sun River									
Goat Mt.	No. Fork	7000	4-2	32.5	9.9	2.7 : 5.6:15.4: 5.5 : 6.6	7.2	150	137
Marias	Two								
Marias Pass	Medicine	5250	3-31	44.6	17.7	5.6 : 9.7:22.2: 9.4 :12.5	11.9	142	149
Rocky Boy	Sage Cr.	5250	3-29	16.7	4.5	6.0: 6.2: 7.1 : 3.1			
Musselshell									
Orville Harris	No. Fork	6540	3-29	13.5	3.1	4.3 : 4.3: 6.1: 4.6 : 4.0	4.8	78	65
Grasshopper	4 Mile	7000	4-1	17.2	3.6	3.2 : 6.1: 5.8: 4.0 : 2.9	4.4	124	82
Half Moon	Flat Willow	5500	4-1	24.7	7.2	6.2 :11.3: 7.6: 6.7 : 5.4	7.5	133	96
Cyrstal Lake	Ross Fork	6000	3-31	31.0	10.8	8.2 :16.1:10.5:13.7 : 8.6	11.4	126	95
Kings Hill	Belt	7950	4-1	50.2	17.4	8.8 :12.0:14.2:10.9 : 9.5	11.1	183	157

MONTANA COOPERATIVE SNOW SURVEYS

April 1, 1946

Drainage Basin Name of Snow Course	Local Water-shed	Elev. of Snow Course	Date	1946 Measurements Snow Depth	Water Content	Water Content Readings for Corresponding Dates 1941, 1942, 1943, 1944, 1945	5 Yr. Av.	1946 Compared to 1945%	5Yr.Av.%
YELLOWSTONE									
Main Stem									
Lake	Yellowstone	7850	No	Report		5.8: 6.9:20.7: 8.0: 8.1: 9.9			
Canyon	Yellowstone	7750	3-31	42	11.9	5.6: 6.2:18.7; 8.5: 8.1: 9.4		147	127
Norris-Madison	Gibbon	7550	4-3	32.1	8.7	5.5: 6.3:15.5: 8.8: 7.6: 8.7		114	100
Crevice #1	Gardiner	8400	4-1	35	9.4	5.6: 6.7:14.7: 9.2: 7.3: 8.7		129	108
Crevice #2	Gardiner	8400	4-1	37	9.9	5.3: 6.3:14.6: 9.3: 7.2: 8.5		137	116
BlackTail Deer	Blk.Tail Deer Cr.	7500	4-2	23.9	12.2	5.9: 6.8:15.6: 5.2:			
Lupine	Lupine Creek	7300	4-2	43.2	14.3	6.9: 7.8:18.6: 5.7:			
SHIELDS RIVER									
Porcupine	Shields River	6500	4-1	13.8	3.8	2.1: 5.4: 2.6: 2.7: 3.3: 5.2		115	73
BOULDER									
Independence	Boulder	8000	3-29	65.9	21.5	10.3: 13.9:27.2:12.5:13.8:15.5		156	139
Hell's Canyon	Boulder	6000	3-30	9.5	3.3	0 : 3.8: 5.0: 5.3: 3.5: 3.5		94	94
CLARK'S FORK									
Cooke City	Soda Butte	7400	4-1	27	6.6	4.1: 5.6:13.6: 4.1: 4.5: 6.4		146	103
Camp Senia	Rock Creek	7870	3-29	28.5	7.9	4.1: 6.1:12.3: 8.4: 9.3: 8.0		85	99

MONTANA COOPERATIVE SNOW SURVEYS
Columbia Basin

April 1, 1946

Drainage Basin / Name of Snow Course	Local Water-shed	Elev. of Snow Course	1946 Measurements /Date	Snow Depth	Water Content	Water Content Readings For Corresponding Dates 1941, 1942, 1943, 1944, 1945	5 Yr. Av.	1946 Compared to 1945%	1946 Compared to 5Yr.Av.%
FLATHEAD									
Big Creek	Post Cr.	6750	3-29	111	46.0	: 23.5 : 29.9: 42.6: 29.5: 34.7	32.0:	133	144
Cattle Queen	Indian Cr.	4700	3-29	92	39.4	: 18.3 : 19.7: 31.2: 19.6: 26.3:	23.0:	149	171
Desert Mt.	Mdl.Fk.Flathead	5600	3-29	42	15.3	: 7.4 : 8.8: 18.8: 8.6: 12.5:	11.2:	122	136
Elk Mt.	Post Cr.	6750	3-27	66	24.1	: 14.5 : 16.3: 23.4: 16.9: 25.4:	19.3:	95	125
Freezout Smt.	N.Fk.Flathead	7000	4-2	87	34.2	: 16.3 : 21.9: 39.4: 17.8: 22.6:	23.6:	151	145
Goat Mt.	Sun River	7000	4-2	32.5	9.9	: 2.7 : 5.6: 15.4: 5.5: 6.6:	7.2:	150	137
Hoodo Creek	Kootenai	6200	4-1	146	53.0	: 22.8 : 29.6: 59.5: 26.7: 41.6:	36.0:	127	147
Kisheneen	N.Fk.Flathead	4300	4-2	19	5.6	: 0.9 : 1.8: 8.2: 1.1: 0.8:	2.6:	700	216
Logan Creek	Stillwater	4300	3029	25	1.6	: 3.6 : 2.8: 11.5: 9.1: 4.1 :	6.2:	39	26
Marias Pass	Two Medicine	5250	3-31	44.6	17.7	: 5.6 : 9.7: 22.2: 9.4:12.5 :	11.9:	142	149
N.Fork Jocko	Jocko R.	6330	4-2	116	48.5	: 21.3 : 27.0: 42.0 : 28.4:36.9 :	31.1:	131	156
Stuart Mt.	Missoula	7400	4-3	88	36.0	: 17.0 : 22.2: 38.3 : 21.8:29.3 :	25.7:	123	140

MONTANA COOPERATIVE SNOW SURVEYS
Columbia Basin

April 1, 1946

Drainage Basin Name of Snow Course	Local Water-shed	Elev. of Snow Course/	1946 Date	Measurements Snow Depth	Measurements Water Content	Water Content Readings for Corresponding Dates 1941, 1942, 1943, 1944, 1945	5 Yr. Av.	1946 Compared to 1945%	1946 Compared to 5 Yr. Av.%
BITTERROOT									
Baree Mt.	Methow River	6000	4-1	121	46.7	19.2: 24.8 : 46.1: 21.3 : 27.8	27.8:	168	168
Gibbons Pass	Big Hole	7100	4-1	64	25.4	14.3: 21.6 : 28.8: 14.9 : 16.5	19.2:	154	132
Look Out	St. Regis	5250	4-1	101	41.8	20.1: 18.9 : 37.2: 17.0 : 27.7	24.2:	151	173
Mud Cr. Pasture	Clearwater	4500	4-3	10	4.1	1.3: 3.6 : 10.1: 3.8 : 3.1	4.4:	132	93
Nez Perce Pass	Selway	6575	4-1	44	14.9	6.2: 11.1 : 26.7: 13.9 : 17.0	15.0:	88	99
Skalkaho Summit	Flint Cr.	7258	4-3	62	23.7	10.7: 17.6 : 30.3: 16.8 : 16.2	18.3:	146	129
BLACKFOOT									
Summit Springs Camp	Blackfoot	4203	4-3	13	7.5	2.7: 5.9 : 14.4: 6.6 : 7.1	7.3:	106	103
Pipestone Pass	Jefferson	7200	4-2	22	5.7	3.5: 5.4 : 6.5: 4.6 : 5.1	5.0:	112	114
Slide Rock Mt.	Rock Cr.	7100	3-28	42	13.7	4.5: 10.6 : 18.6: 9.3 : 10.3	10.7:	133	128
Stemple Pass	Lt. Prickly Pear	6900	4-1	30.1	8.6	3.4: 7.3 : 14.6: 6.3 : 9.2	8.2:	93	105
Storm Lake #2	Rock Cr.	7780	4-1	45	4.0	8.6: 16.1 : 20.2: 10.3 : 8.8	12.8:	159	109
Intergaard	Rock Cr.	6450	4-1	26	6.2	:(April 1,	5.9 :		
Stuart Mill	Rock Cr.	6500	4-1	19	4.0	:(Measurements	2.90:		
Southern Cross	Rock Cr.	6500	4-1	13	3.2	:(began 1945	2.45:		
KOOTANAI									
Baree Mt.	Methow Cr.	6000	4-1	121	46.7	19.2: 24.8 : 46.1: 21.3 : 27.8	27.8:	168	168
Summit Sprgs.		4203	4-3	13	7.5	2.7: 5.9 : 14.4: 6.6 : 7.1	7.3:	106	103